

IN THE CLAIMS:

Please rewrite the claims to read as follows:

- 1 1. (Currently Amended): A method for fast reboot of a computer having an attached
2 disk array and an internal random access memory (RAM) comprising the steps of:
3 retaining a copy of ~~in-memory data, from which a~~ an operating system kernel is
4 ~~reloaded,~~ on a reserved storage location of the RAM;
5 performing predetermined reboot operations with a boot mechanism; and
6 reloading the operating system at a location in the RAM based upon the copy of
7 the operating system retained at the reserved storage location after the step of performing
8 the predetermined reboot operations.
- 1 2. (Original): The method as set forth in claim 1 wherein the boot mechanism is adapted
2 to perform predetermined full reboot steps based upon a full reboot instruction from the
3 operating system, and wherein the predetermined reboot operations omit the predeter-
4 mined full reboot steps when the operating system is reloaded from the reserved storage
5 location based upon a warm reboot instruction so as to perform a less-than-full reboot.
- 1 3. (Original): The method as set forth in claim 2 wherein the predetermined full reboot
2 steps include loading into the memory a copy of on-disk data from which the operating
3 system kernel is reloaded, and the predetermined full reboot steps further include at least
4 one of (a) fully clearing of the RAM, including the reserved storage location, and (b)
5 fully testing the RAM.

1 4. (Original): The method as set forth in claim 3 wherein the predetermined full reboot
2 steps further include testing at least one of an LCD display chip and a Serial Input/Output
3 (SIO) chip.

1 5. (Original): The method as set forth in claim 2 wherein the copy of in-memory data
2 comprises a compressed image of the operating system kernel adapted to be uncom-
3 pressed and extracted to form the operating system at the location in the RAM.

1 6. (Original): The method as set forth in claim 5 wherein the step of reloading includes
2 loading the compressed image of the operating system kernel from the reserved storage
3 location to a space within the RAM and thereafter uncompressing and extracting the op-
4 erating system kernel into the RAM from the compressed image of the operating system
5 loaded into the RAM.

1 7. (Original): The method as set forth in claim 6 further comprising, after the step of un-
2 compressing and extracting, freeing-for-overwrite the space within the RAM into which
3 the compressed image of the operating system kernel is loaded.

1 8. (Original): The method as set forth in claim 6 wherein one of the predetermined full
2 reboot steps comprises copying the compressed image of the operating system into the
3 reserved storage space from the compressed image of the operating system in the RAM.

1 9. (Original): The method as set forth in claim 2 wherein one of the predetermined re-
2 boot steps comprises loading the in-memory copy of the data at the reserved storage lo-
3 cation based upon a disk-stored copy of the data on the array of disks.

1 10. (Original): The method as set forth in claim 2 further comprising providing a warm
2 reboot instruction in response to a condition that enables the less-than-full reboot of the
3 computer.

1 11. (Original): The method as set forth in claim 10 wherein the condition includes at
2 least one of a user-generated warm reboot command and a predetermined software panic
3 condition that can be repaired by the less-than-full reboot of the computer.

1 12. (Original): The method as set forth in claim 10 wherein the step of providing the
2 warm reboot instruction includes setting a flag in the boot mechanism from a full reboot
3 state to a warm reboot state.

1 13. (Original): The method as set forth in claim 10 further comprising reverting to the
2 full reboot if the copy of the data is corrupted.

1 14. (Currently Amended): A system for performing a fast reboot of a computer having
2 an array of attached disks and an internal memory comprising:

3 a boot mechanism that carries out full reboot operations on the ~~file server com-~~
4 puter, the boot mechanism including a flag adapted to indicate performance by the boot
5 mechanism of either (a) the full reboot operations or (b) warm reboot operations wherein
6 at least one of the full reboot operations is skipped, including a loading of data from the
7 array of disks that generates the operating system kernel at a predetermined kernel loca-
8 tion in the memory.

1 15. (Currently Amended): The system as set forth in claim 14 wherein the full reboot
2 operations that are skipped include a full test of the memory, a zeroing of the memory,

3 ~~and a shutdown of a processor of the file server computer and a loading of data from the~~
4 ~~array of disks that generates the operating system kernel at a predetermined kernel loca-~~
5 ~~tion in the memory.~~

1 16. (Currently Amended): The system as set forth in claim ~~15~~ 14 wherein the memory
2 includes a reserved storage space that stores a copy of data from which the operating
3 system is loaded into the predetermined location in the memory during the warm reboot
4 operations, the boot mechanism being adapted to retain uncleared the reserved storage
5 space during the warm reboot operations, and being adapted to clear the reserved storage
6 space during the full reboot operations.

1 17. (Original): The system as set forth in claim 16 wherein the copy of the data stored in
2 the reserved storage space is a compressed image of the operating system kernel and the
3 boot mechanism is adapted to load the compressed image of the operating system kernel
4 from the reserved storage space into a space in the memory outside the reserved storage
5 space, and further comprising a boot loader that subsequently uncompresses and extracts
6 the compressed image of the operating system kernel at the space in the memory outside
7 the reserved storage space to generate the operating system kernel at the predetermined
8 kernel location in the memory.

1 18. (Original): A computer-readable medium including program instructions executing
2 on a computer for fast reboot of a computer having an attached disk array and an internal
3 random access memory (RAM), the program instructions performing the steps of:
4 retaining a copy of in-memory data, from which a operating system kernel is re-
5 loaded, on a reserved storage location of the RAM;
6 performing predetermined reboot operations with a boot mechanism; and

7 reloading the operating system at a location in the RAM based upon the copy of
8 the operating system retained at the reserved storage location after the step of performing
9 the predetermined reboot operations.

1 19. (Original): The computer-readable medium as set forth in claim 18 wherein the boot
2 mechanism is adapted to perform predetermined full reboot steps based upon a full reboot
3 instruction from the storage system, and wherein the predetermined reboot operations
4 omit the predetermined full reboot steps when the operating system is reloaded from the
5 reserved storage location based upon a warm reboot instruction so as to perform a less-
6 than-full reboot.

1 20. (Original): The computer-readable medium as set forth in claim 19 wherein the pre-
2 determined full reboot steps include loading into the memory a copy of on-disk data from
3 which the operating system kernel is reloaded, and the predetermined full reboot steps
4 further include at least one of (a) fully clearing of the RAM, including the reserved stor-
5 age location, and (b) fully testing the RAM.

1 21. (Original): The computer-readable medium as set forth in claim 20 wherein the pre-
2 determined full reboot steps further include testing at least one of an LCD display chip
3 and a Serial Input/Output (SIO) chip.

1 22. (Original): A method for carrying out a warm reboot on a computer having a random
2 access memory (RAM) and an array of attached disks that skips predetermined full re-
3 boot steps comprising the steps of:

4 directing a boot mechanism that carries out the full reboot steps to undergo a
5 warm reboot;

6 retaining an uncleared reserved storage space in the RAM so as to store in-
7 memory data from which the operating system kernel is generated; and

8 after predetermined warm reboot steps are performed, generating the operating
9 system kernel from the in-memory data in a portion of the RAM outside the reserved
10 storage space.

1 23. (Original): The method as set forth in claim 22 wherein the step of generating the
2 operating system kernel includes uncompressing a compressed image of the operating
3 system kernel.

1 24. (Original): The method as set forth in claim 23 wherein the step generating further
2 includes copying the in-memory data to form the compressed image of the operating
3 system kernel at a location within the portion of the RAM outside the reserved storage
4 location.

1 25. (Original): The method as set forth in claim 23 wherein the step of generating in-
2 cludes performing an error check on the data and, if the in-memory data is corrupted, re-
3 verting to the full reboot steps.

1 26. (Original): The method as set forth in claim 23 wherein the full reboot steps include
2 (a) clearing the reserved storage space, (b) loading, from the disk array, on-disk data from
3 which the operating system kernel is generated and (c) copying the on-disk data to the
4 reserved storage space to thereby store the in-memory data.

1 27. (Original): The method as set forth in claim 26 wherein the full reboot steps further
2 comprise at least one of (a) fully clearing the memory, and (b) performing a full test of
3 the memory.

1 28. (Original): A method for fast reboot of a computer having the random access mem-
2 ory comprising the steps of:

3 performing predetermined reboot steps with a boot mechanism; and
4 reloading an operating system kernel extracted from a stored operating system
5 kernel image, the operating system kernel image being stored in a reserved location of the
6 random access memory prior to the step of performing the predetermined reboot steps,
7 the reserved location remaining uncleared after the step of performing the predetermined
8 reboot steps.

1 29. (Original): A method for rebooting a computer comprising the steps of:

2 in response to a predetermined reboot command, selectively reloading an operat-
3 ing system kernel to a memory of the computer from either a first compressed kernel im-
4 age of the operating system or a second compressed kernel image of the operating sys-
5 tem, each of the first compressed kernel image and the second compressed kernel image
6 being located on different non-removable storage media, wherein an access speed for the
7 first compressed kernel image is quicker than an access speed for the second compressed
8 kernel image.

1 30. (Original): The method as set forth in claim 29 further comprising storing the first
2 compressed kernel image is on a reserved space of the memory that remains uncleared
3 during a warm reboot process having predetermined warm reboot steps and storing the
4 second compressed kernel on a disk operatively interconnected to the computer.

1 31. (Original): The method as set forth in claim 30 wherein the step of storing the first
2 compressed kernel image includes loading a copy of the second compressed kernel image
3 onto the reserved space during a full reboot process that includes both full reboot steps
4 and the predetermined warm reboot steps.

1 32. (Original): The method as set forth in claim 31 wherein the full reboot steps include
2 clearing the memory, including the reserved storage space and testing each of an LCD
3 display chip and a serial input/output (SIO) chip.

1 33. (Currently Amended): An operating system for a computer having an operating
2 system kernel stored in a memory of the computer comprising:

3 a warm reboot instruction, responsive to a predetermined reboot condition, that
4 sets an indicator in a boot mechanism of the computer to perform a warm reboot process
5 that includes predetermined boot steps that are fewer than the boot steps performed by the
6 boot mechanism in response to a full reboot instruction; and

7 a compressed kernel image located at a reserved storage space in the memory, the
8 compressed kernel image being adapted to be accessed to reload the compressed kernel
9 image into the memory during a warm reboot process.

1 34. (Original): The operating system as set forth in claim 33 wherein the boot steps of
2 the full reboot process include mechanisms for fully clearing the memory and reloading a
3 compressed kernel image of the operating system from a disk into the memory.

1 35. (Currently Amended): The operating system as set forth in claim 34 ~~further com-~~
2 ~~prising a~~ wherein the compressed kernel image is located at a reserved storage space in

3 the memory that is remote from the area controlled by the operating system and that re-
4 mains uncleared during the warm reboot process, ~~the compressed kernel image located at~~
5 ~~the reserved storage space being adapted to be accessed to reload the compressed kernel~~
6 ~~image into the memory during a warm reboot process.~~

1 36. (Original): The operating system as set forth in claim 33 wherein the warm reboot
2 instruction is based upon a condition in the computer that requires only the boot steps of
3 the warm reboot process and that allows the boot steps of the full reboot process to be
4 skipped.

1 37. (Original): The operating system as set forth in claim 33 wherein the indicator in-
2 cludes a plurality of warm reboot levels that enable each of the boot steps of the full re-
3 boot process to be selectively performed or skipped.

Please insert the following new claims 38 *et seq.*

1 38. (New) The method as in claim 1, wherein the attached disk array is one or more
2 disks.

1 39. (New) The system as in claim 14, wherein the array of attached disks is one or more
2 disks.

1 40. (New) The computer-readable media as in claim 18, wherein the attached disk array
2 is one or more disks.

1 41. (New) The method as in claim 22, wherein the array of attached disks is one or more
2 disks.

1 42. (New) A method for fast reboot of a computer, the computer having an operating
2 system loaded from a first memory, the method comprising the steps of:

3 saving a copy of an operating system in a second memory, the second memory
4 having faster access than the first memory;

5 performing predetermined reboot operations; and

6 reloading the operating system from the operating system copy in the second
7 memory.

1 43. (New) The method as in claim 42, further comprising the step of: compressing the
2 copy of the operating system in the second memory.

1 44. (New) The method as in claim 43, further comprising the step of: uncompressing the
2 copy of the operating system.

1 45. (New) The method as in claim 42, wherein the copy of the operating system is lo-
2 cated at a reserved storage space in the second memory that is remote from an area con-
3 trolled by the operating system and that remains uncleared during the fast reboot process.

1 46. (New) The method as in claim 42, wherein the step of performing predetermined
2 reboot operations further comprises skipping at least one step selected from the group
3 consisting of: performing a full memory test, reloading an operating system from the first
4 memory, clearing system memory, testing an LCD display chip, and testing a serial in-
5 put/output (SIO) chip.

1 47. (New) The method as in claim 42, further comprising: setting a flag indicating the
2 fast reboot.

1 48. (New) The method as in claim 42, wherein the second memory is a volatile memory.

1 49. (New) The method as in claim 48, wherein the second memory is a RAM.

1 50. (New) The method as in claim 42, wherein the second memory is a non-volatile
2 memory.

1 51. (New) The method as in claim 50, wherein the second memory is an NVRAM.

1 52. (New) The method as in claim 50, wherein the second memory is a flash memory.

1 53. (New) The method as in claim 42, wherein the first memory is a disk memory.

1 54. (New) A computer for performing a fast reboot, the computer comprising:

2 a first memory;

3 an operating system loaded from the first memory;

4 a second memory to save a copy of the operating system, the second memory
5 having faster access than the first memory; and

6 a boot mechanism to perform predetermined reboot operations, including reload-
7 ing the operating system from the operating system copy in the second memory.

1 55. (New) The computer as in claim 54, wherein the operating system is compressed in
2 the second memory.

1 56. (New) The computer as in claim 55, wherein the operating system is uncompressed
2 by the boot mechanism.

1 57. (New) The computer as in claim 54, further comprising: a reserved storage space in
2 the second memory that is remote from an area controlled by the operating system and
3 that remains uncleared during the fast reboot process, the reserved storage space to save
4 the copy of the operating system.

1 58. (New) The computer as in claim 54, wherein the predetermined reboot operations
2 further comprise skipping at least one step selected from the group consisting of: per-
3 forming a full memory test, reloading an operating system from the first memory, clear-
4 ing system memory, testing an LCD display chip, and testing a serial input/output (SIO)
5 chip.

1 59. (New) The computer as in claim 54, further comprising: a flag to indicate the fast
2 reboot.

1 60. (New) The computer as in claim 54, further comprising: a volatile memory as the
2 second memory.

1 61. (New) The computer as in claim 60, further comprising: a RAM as the second
2 memory.

1 62. (New) The computer as in claim 54, further comprising: a non-volatile memory as
2 the second memory.

1 63. (New) The computer as in claim 62, further comprising: an NVRAM as the second
2 memory.

1 64. (New) The computer as in claim 62, further comprising: a flash memory as the sec-
2 ond memory.

1 65. (New) The computer as in claim 54, further comprising: a disk memory as the first
2 memory.

1 66. (New) A computer for performing a fast reboot, the computer comprising:
2 a first memory;
3 an operating system loaded from the first memory;
4 means for saving a copy of an operating system in a second memory, the second
5 memory having faster access than the first memory;
6 means for performing predetermined reboot operations; and
7 means for reloading the operating system from the operating system copy in the
8 second memory.

1 67. (New) The computer as in claim 66, further comprising: a volatile memory as the
2 second memory.

1 68. (New) The computer as in claim 66, further comprising: a non-volatile memory as
2 the second memory.

1 69. (New) The computer as in claim 66, further comprising: a disk memory as the first
2 memory.

1 70. (New) A computer readable media, comprising: said computer readable media con-
2 taining instructions for execution in a processor on a computer having an operating sys-
3 tem loaded from a first memory, the instructions for the practice of the method of,

4 saving a copy of an operating system in a second memory, the second memory
5 having faster access than the first memory;
6 performing predetermined reboot operations; and
7 reloading the operating system from the operating system copy in the second
8 memory.

1 71. (New) Electromagnetic signals propagating on a computer network, comprising:
2 said electromagnetic signals carrying instructions for execution in a processor on a com-
3 puter having an operating system loaded from a first memory, the instructions for the
4 practice of the method of,

5 saving a copy of an operating system in a second memory, the second memory
6 having faster access than the first memory;
7 performing predetermined reboot operations; and
8 reloading the operating system from the operating system copy in the second
9 memory.